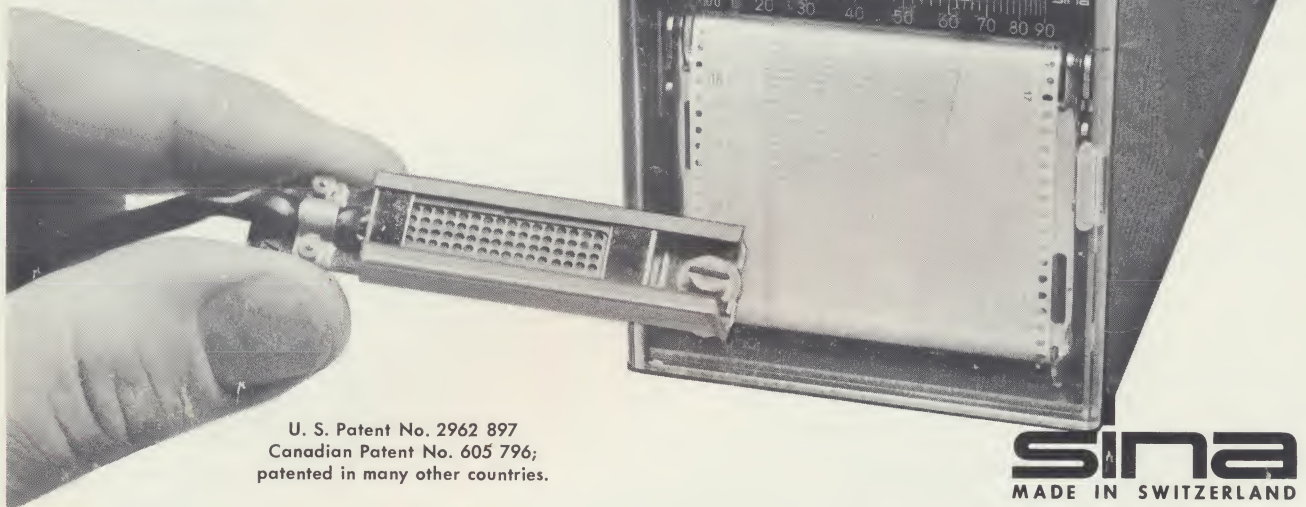


Humidity and/or Temperature and Moisture Indicators, Recorders, Controllers

- **Extremely Compact**
- **Full Humidity Range Capabilities**
- **Automatically Temperature Compensated Over 14° - 194° F. Range.**
- **Contact Not Required To Measure Moisture**
- **Unaffected by Density or Particle Size**



U. S. Patent No. 2962 897
Canadian Patent No. 605 796;
patented in many other countries.

Sina
MADE IN SWITZERLAND

Many production methods require the constant and critical measurement and control of humidity and moisture. In addition to the many obvious humidity measuring applications, the SINA equi-HygroScope offers continuous moisture measuring of products during production for increased efficiency of dryers or conditioners, higher production, less waste and better quality. The sensor's unique design and compact size makes it possible to use hygrometry effectively for moisture determination unaffected by density or particle size—both in the laboratory or on continuous process lines.

The Sina-Scope instrument, utilizing a self-balancing AC bridge circuit, provides direct reading instantaneously and automatically temperature compensated. Although

capable of measuring any variable which can be expressed as a change in electrical resistance, the standard models in this brochure are specifically for measuring, indicating, recording and controlling % relative humidity/equilibrium moisture and/or temperature. The instrument, along with the proper sensor and accessories, can be employed for checking the % rh/em and/or temperature in air, gases, stacks, bales, bags, etc., either continuously during production runs or intermittently on individual samples. The sensing element illustrated above can measure 2% to 100% relative humidity and will replace three or four different sensors required with other full range instruments. A sensor is also available for the 0% to 15% rh/em range.

HANS SICKINGER CO. |

576 So. Telegraph, Pontiac, Michigan
Telephone 313 - 338-4095

● INSTRUMENTATION ● CONTROL ● PRODUCTION

Operating Principle

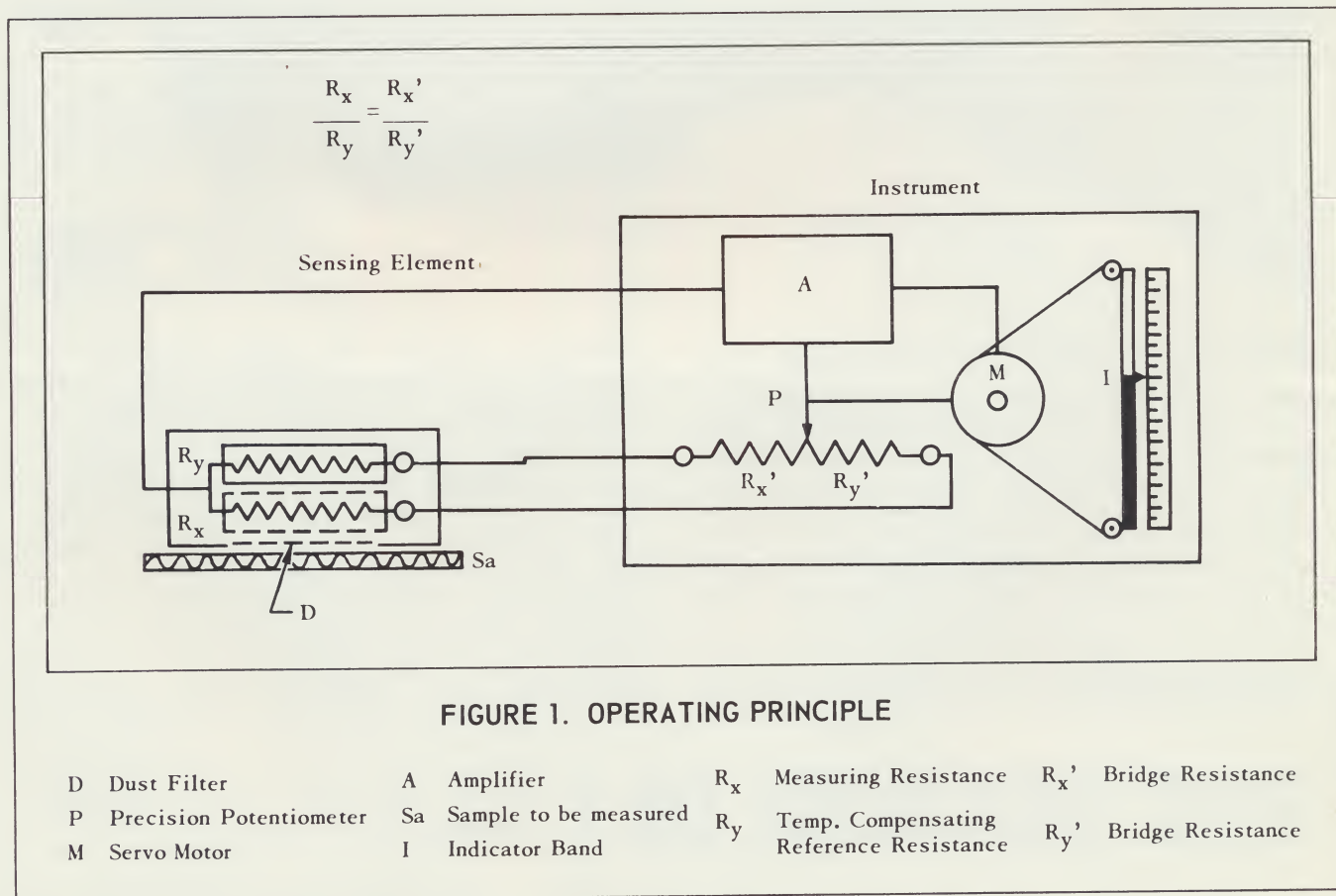
Every substance which has the ability to absorb or give off moisture has a partial vapor pressure on its surface. This partial vapor pressure is directly related to the internal moisture of the substance and, therefore, indicates the relative wetness or dryness of the substance. This is true regardless of the physical characteristic of the substance whether powder, granulate, liquid or solid.

The Sina sensing element, using a hygroscopic salt, measures this surface partial vapor pressure. In addition to the sensing element, the sensor also contains a second element which is sealed at a constant reference humidity but exposed to the same ambient temperature. Connecting both into a bridge circuit produces automatic temperature compensation throughout the measuring range. When it is essential to know the water content (in % weight) of a substance it can quickly be determined by using the isotherm of sorption. These curves are known for many substances or

can easily be determined experimentally. (See eOP under accessories)

In addition to automatic temperature compensation, each sensing element is factory calibrated and delivered with a plug-in type calibration unit. The plug-in calibration unit provides complete interchangeability of instruments and sensors as well as eliminating the need of calibrating the equipment prior to each use. Although it is wise to check the calibration at regular intervals, the life expectancy of the sensors if properly used according to manufacturer's instructions is 5 years.

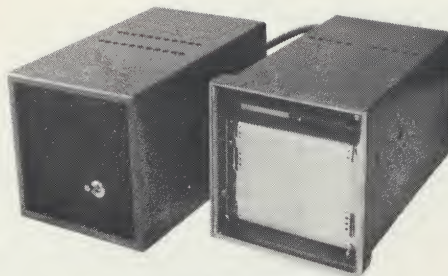
To make the SINA instruments even more useful, temperature needles are available which can be used to read or record temperature intermittently or concurrently with % rh/em. Sensors are available which combine both humidity sensing and temperature sensing elements. It is thus possible with one instrument to measure humidity and temperature directly by merely switching from one scale to another, either manually or by internal timer.





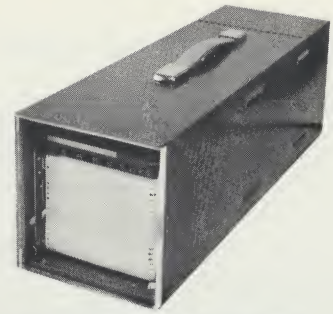
Model SJT

Lightweight indicating instrument for flexibility and portability.



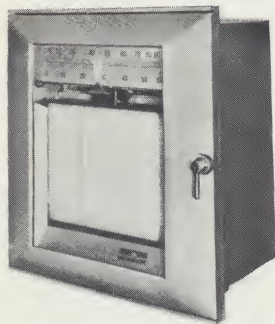
Model SLE or Model SME

Indicating and recording instrument in two units for convenient control panel installation.



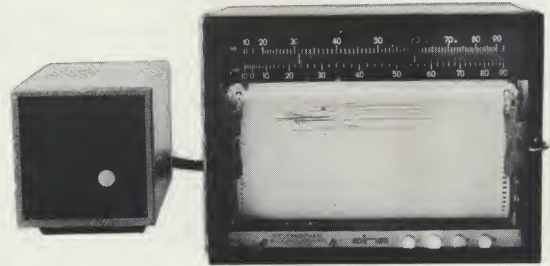
Model SLT or Model SMT

Same indicating and recording instrument as Model SLE but arranged as a portable unit in one housing with carrying handle.



**Model W6P12E-B or
Model W12P12E-B**

Multi-channel indicating and recording instrument. Model W6P12E-B is a six channel unit while the Model W12P12E-B is a twelve channel unit. Both are for face mounting in a console.



Model SBME

Indicating and recording instrument with two channels and wider scale.

The instruments shown above all have inputs (channels) which can be used for either humidity or temperature sensors or other transducers. All Model "S" recorders include a control switch for selecting one of three recording chart speeds. The recording chart paper rolls provide up to 670 hours of recording time.

Basic characteristics and specifications of the instruments are given below. In addition to the standard scales noted in the table almost any 20% rh/em range can be expanded to cover the full scale width. Also available is a 0 to 10 scale divided lineally.

	SJT*	SLT* SMT*	SLE SME	SBME	NJT	GMT	W6P12E-B W12P12E-B
Power Supply	110 Volt - 60 Cycle				6 Volt (4 x 1.5 V. Batt.) or 110 V.-60 Cycle	6 Volt Batt. 8-Day Clockwork Chart Drive	110 Volt 60 Cycle
Scale	4"			10"	Circular 255°	4"	4-3/4"
Bridge Circuit	Logarithmic or Linear				Logarithmic		Logarithmic or Linear
Output Signal	Pot. or Mech. Analog Shaft	Pot. or Mech. Analog Shaft or 1-3 Control Contacts	Pot. or 1-3 Control Contacts	Pot. or 2 or 4 Control Contacts	Not Available		
Measuring Range Limits	0 - 100% rh/em 0 - 212°F. 5 ohm - 100 Mohm (5 - 95% rh/em and 14°-194°F. Standard — others available)				5 - 95% rh/em 14 - 140°F.	40 - 100% rh/em 0 - 122°F.	Same As "S" Models
Number Channels Recorded	N.A.	SLT=1 SMT=2	SLE=1 SME=2	2	2	2	W6P12E-B=6 W12P12E-B=12
Recording Speeds	N.A.	3		1	N.A.	1	1
Width	5-11/16"		5-11/16" recorder and power unit	12-3/4" (recorder) 5-11/16" (power unit)	5-1/2"	5-11/16"	7-1/2"
Height	5-11/16"		5-11/16" recorder and power unit	9-1/2" (recorder) 5-11/16" (power unit)	5-1/2"	5-11/16"	11-3/8"
Depth	12-7/16"	17-11/16"	9-1/2" (recorder) 8-11/16" (power unit)	8" (recorder) 8-11/16" (power unit)	9"	23-1/2"	11-5/8"
Weight	13 lbs.	20 lbs.	10 lbs.	24-1/4 lbs. (recorder) 10 lbs. (power unit)	5-1/2 lbs.	26-1/2 lbs.	40 lbs.

*Standard equipped with carrying handle. Also available as "A" Models for bracket mounting.

Transistorized and Special Models

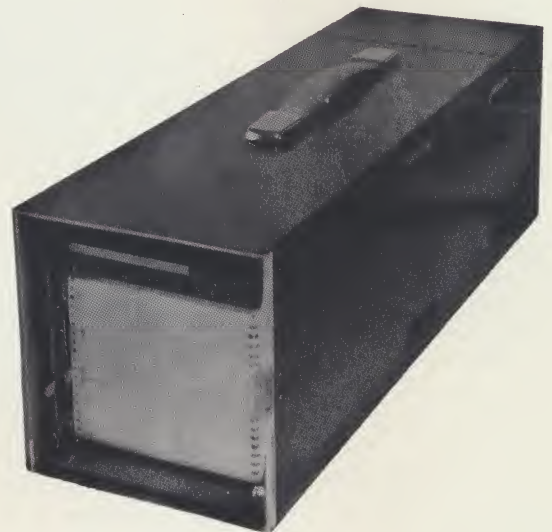


Model NJT-B

The transistorized Model NJT-B is the ultimate in convenience and portability in an indicating instrument because of its small size, light weight and self-contained battery. It can also be used with an external power supply by means of a selector switch on the back. As with other transistorized features, the instrument provides instant-start operation with no need to wait for a warm-up period. This can considerably speed operations when checking intermittent samples.

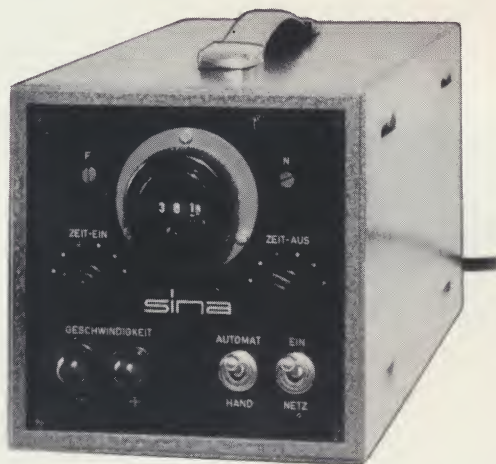
Model GMT

This two channel recorder is transistorized and provides battery operated sensing with an 8-day, manually wound, clockwork operated recorder unit. Recommended for explosive atmosphere conditions such as chemical processing, mine shafts, etc.



Model T1

This PID regulator is designed for controlling machines or systems which are equipped with a speed control motor or variable speed drive. It can be used to control any variable which can be measured by a Sina-Scope and is driven by the instruments analog output.



Model UR2 is a two-point regulator for controlling humidity between 10 and 95% rh/em. It has two signal lights indicating humidity above or below the selected value.

Sensing Elements

There are two basic humidity sensing elements. They both operate on the same balanced bridge principle to provide automatic temperature compensation. The sensitive humidity elements are protected from normal atmospheric contamination by a 1 micron dust filter. To protect and increase sensor life in dusty atmospheres or other specific applications, special mechanical, chemical and solvent vapor filters are available as accessories.

The elements are used in various housings to make up different sensors for specific applications. Each element or sensor can be calibrated for one or several measuring ranges.

The Models eC3 standard size element and eCMF-3 miniature element can measure any range between 5% and 95% rh. A specially calibrated version of the eCMF-3 element measures 0% to 15% rh.

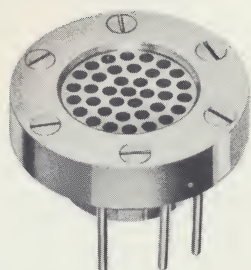
The eC4 and eCMF-4 elements can measure up to 100% rh and are protected against damage due to extended exposure to saturated conditions.

Elements designated as "—4U" can measure any range below 95% rh but still have the protection against saturation damage.

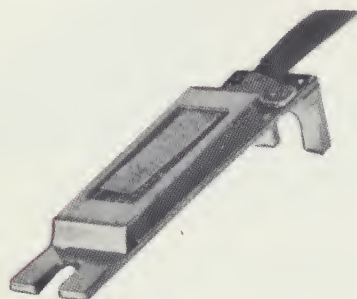
One of the prime advantages of the miniature element is its extremely small size and versatility since it can be used with any of the sensors shown on page 6. It can be sewn into material, welded into plastic or sealed in packages to measure water vapor transmission. Its small mass results in extremely fast temperature stabilization. The —3 elements can also be combined with a temperature probe to read the humidity range as mentioned plus temperature between 14° and 194° F. In the latter case the designation becomes esCMF-3.

The Model number variations are made up as follows: prefix letter "e" stands for humidity sensing, prefix letters "es" stand for humidity and temperature sensing combined.

By means of the various sensor styles and accessories shown on the following pages, these elements have been used for checking moisture in paper, textiles, wood fibers, dry foods, tobacco, starch, dried grass, pharmaceuticals, effervescent tablets, photographic papers and a multitude of similar uses.



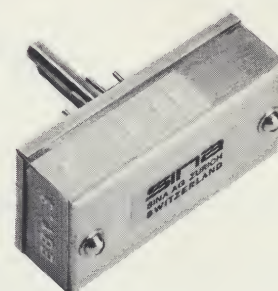
eC3/eC4 Standard Element



eCMF-3/eCMF-4 Miniature Element
(Furnished with 1 ft. cable and plug)

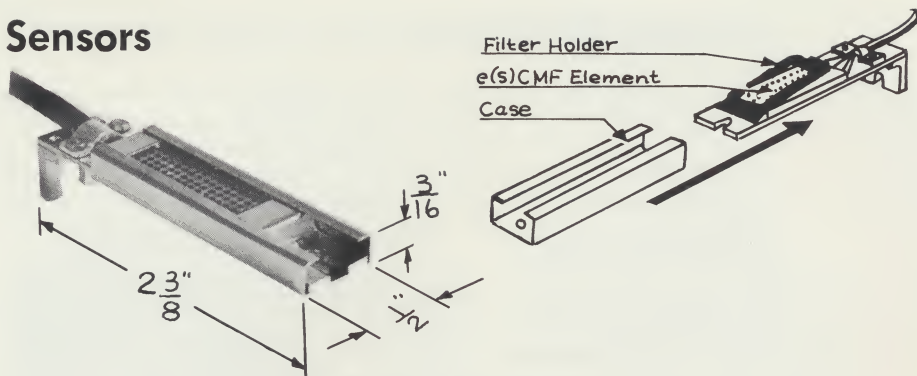
Sensing Element Data

Accuracy	±1%rh
Reproducibility	±0.5%rh
Sensitivity	0.2%rh
Permissible Temperature Limits	0° & 212°F.
Destructive Limits	—148° & +248°F.



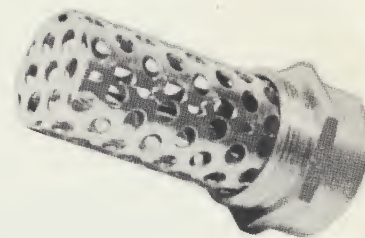
All Sina humidity sensors and temperature needles are delivered with one calibration unit per sensor per measuring range.

Sensors



Miniature Sensor
Type eMPF/esMPF

For humidity (eMPF) or humidity and temperature (esMPF) for packaging research, diffusion and sealing testing and small packages, cans, bottles or wherever space is at a minimum. Filters: eVM1, eVS1, eVL1 and eVP1. Control equipment eKCM, ePV and eQ. Equipped with 1' cable and plug.



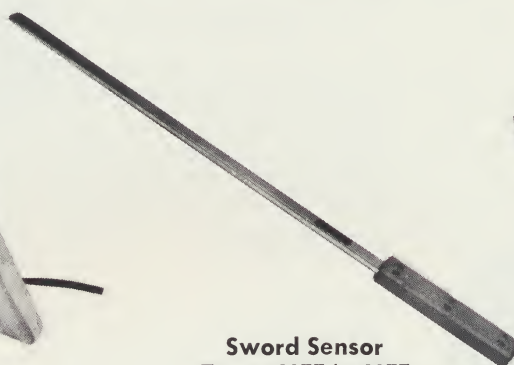
Special Sensor
Type eM40F

Recommended for dryers, cans, drying ovens, containers, ducts and pipelines. Available with 0% to 15% rh/em range if desired. Uses the eCMF elements and sNF temperature needle. Filters and control equipment same as eMPF.



Miniature Sled
Type eMLF/esMLF

Designed for measuring on running webs or fast moving materials such as powders, granulates, etc. on conveyors, chutes, etc., where constantly changing temperature is a factor. Uses eCMF element and sMF temperature probe. Filters and control equipment same as eMPF.



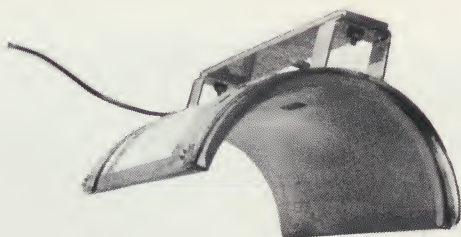
Sword Sensor
Type eMFF/esMFF

Can be used for measuring humidity in gases, ducts, containers, etc., as well as materials in stacks, bales, bags, etc. Uses miniature sensing element eCMF/esCMF. Equipped with 6' cable and plug. Filters and control equipment same as eMPF.



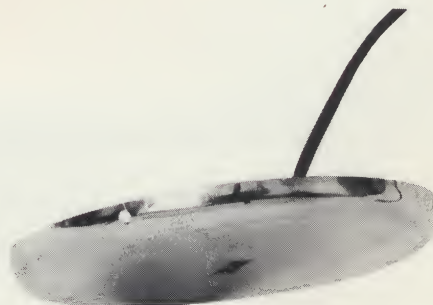
Web Roll Sensor
Type eMWF/esMWF

For contactless measuring of webs running around a roller. Uses miniature sensing element and sMF temperature probe. Filters and control equipment same as eMPF.



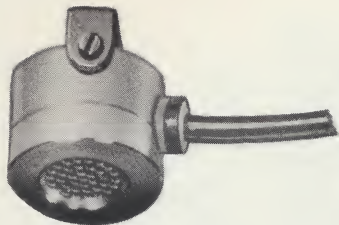
Trough Sensor
Type eMRF/esMRF

Specially designed for measuring — without contacting humidity and/or temperature in cables, ropes, yarns, artificial fibers, etc. Uses eCMF element and sMF temperature probe. Filters and control equipment same as eMPF.



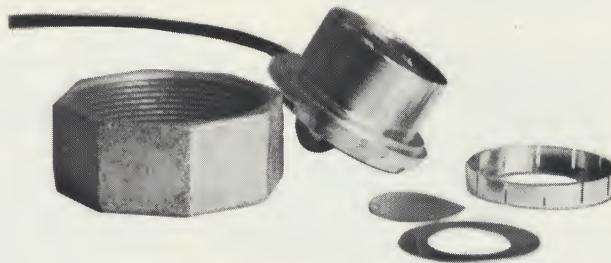
Round Miniature Sled
Type eMTF/esMTF

Performs same functions as eMLF except that it can be used to traverse webs because of its round shape. Filters and control equipment same as eMPF.



Cylinder Sensor Type eZFB

For continuous humidity measurements in air or other gases, as well as in dryers, ducts, containers, etc. For semi-permanent or permanent installation and sample measuring when used with eKZ and eP (See Page 8). Uses sensing element eC3/eC4 and is supplied with 6' cable. Filters: eVM2, eVS2, eVL2 and eVPZ. Control equipment eKZ+eP+eQ.



Vacuum Tight Sensor Type eVF

For installation in ducts, pipes, etc. Filters: eVS2, eVM2, eVL3 and eVP3. Element eCMF.



Material Sensor with Mass Measuring Plate Type eMFP

For measuring moisture in individual samples such as cloth, leaves, sheets, etc. The mass measuring plate is for quick temperature adaptation of the sample to the sensor. Uses elements eC3/eC4. Control equipment: eKM+eP+eQ.



Sled Sensor Type eLF

A heavy-duty sensor for measuring humidity and/or temperature on running webs. Can be in contact with or slightly away from web. Uses sensing element eC3/eC4. Filters: eVM2, or eVS2. Control equipment: eKL+eP+eQ.

Temperature Probes

The standard temperature elements are made of semi-conductors in a 1/16" diameter tube approximately 2-1/8" long with an active length of 1-1/8". This semi-conductor has the same linearity characteristics as the humidity sensing element which permits using both temperature and humidity sensors on the same instrument. Temperature

range of the needles and probes is 14° to 194° F. Any of the basic needles can be obtained in platinum with a temperature range of -328° to +1100° F. by merely exchanging the letter "p" for "s" in front of the type letters.



Type sNF has hex head fitting for permanent installation. Also used in eM40F and eLF sensors.



Type sMF is designed for use with humidity sensors eMLF, eMRF, eMWF and eMTF.



Type sHF is the same as sNF but with plastic handle to permit handling without body temperature affecting reading.



Type sAF is glued to surfaces to measure surface temperature.

Accessories

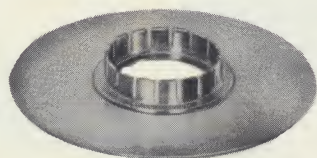
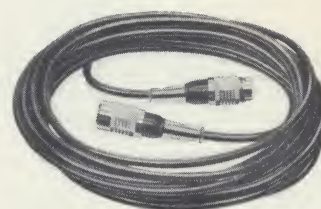


Plate Attachment eT — To stabilize sensor eZF on flat surfaces for use with individual flat samples or for permanent mounting or for attaching filters.



Separating Sword Type eF2 — Facilitates inserting sword sensor eMFF by separating stacks, piercing bales, etc.



Cable Extension Cords Type F-K-V

F-K5V = 16½' long

F-K10V = 33' long

F-K15V = 49½' long

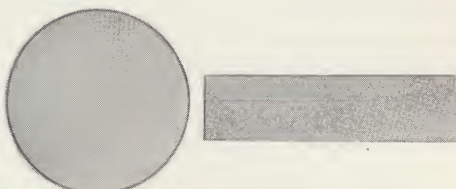
F-K20V = 66' long*

*(Max. without line amplification)

For use with eCMF-3/eC3 elements specify F3K-V cords. For eCM-4 elements or between line amplifiers and instruments, specify F4K-V cords.



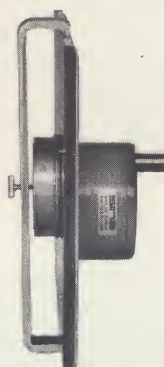
Model eOP is a system for quickly and easily determining relationship between water content and relative humidity equilibrium of hygroscopic materials (isotherm of sorption).



Round filters for use with sensors eVF, eLF and eZFB. **Rectangular filters** for miniature sensor types.



Measuring Bowl Type ePV — For use with eKCM as control system for eMCF element.



eKL+eP+eQ



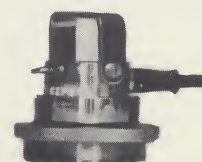
eQ



eP



eKM+eP+eQ



eKC+eP+eQ

A control system with constant humidity tablets and proper attachments and accessories for checking sensing accuracy of the Sina Sensors. Bowl eP used with eZFB sensor for sample measuring.

Filter Type		Description
Round	Rectangular	
eVM2	eVM1	Mechanical throw-away
eVS2	eVS1	Chemical throw-away
eVL2/eVL3 (Uses holder) eVL2H	eVL1 (Uses holder) eVL1H	Solvent vapor filter
eVP2	eVP1	Perforated protection plate against sharp materials

For further information contact your nearest representative

HANS SICKINGER CO.
576 South Telegraph Road
Pontiac, Michigan 48053

QUESTIONNAIRE FOR: MOISTURE, TEMPERATURE AND COMBINED
MOISTURE AND TEMPERATURE MEASURING

1. Kind of material on which measurements are to be made:
2. Temperature range: from _____ to _____ °F.
3. Moisture range: from _____ to _____ % Rel. Humidity/equa.
OR from _____ to _____ % water content
4. Special characteristics of the material:
☐ aggressive ☐ dusty(particle size) ☐ sticky ☐ abrasive
☐ other
5. If measurements are to be made in a gas, give:
Name _____ Designation _____ Composition _____
6. If measurements are to be made on the surface of liquids, give:
Designation _____ Composition(if possible) _____
7. If measurements are to be made in or on the surface of solids,
give:
Designation _____ Composition(if possible) _____
8. In case of mixtures, give:
Designation of individual components _____
9. Description of measurement problem:

10. In case of a production process, please specify:
☐ Drying process ☐ Moistening process ☐
☐ with or without extraction or addition of water
11. Description of location where measurement is to be made. If
possible supply drawing of process system and/or measurement
location.
12. What type of output is desired:
☐ indicating ☐ magnified indication
☐ recording ☐ automatic controlling
☐ battery operated indication ☐ battery operated recording
13. If automatic controlling is desired please state problem:

14. Additional information, for instance, measurements now being
made: _____

15. Company name _____ (Please print)
Address: _____

Name: _____
Department: _____

Use back if necessary